Ritik Soni

Curriculum Vitae

Contact

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About Me

As a dedicated **institute postdoctoral fellow** working under Prof. Dootika Vats at IIT Kanpur, I have a strong background in mathematics, applied probability, and stochastic processes. My current area of research includes **Markov chain Monte Carlo** (MCMC) methods and its connections with the Langevin stochastic differential equations. My thesis work focuses on studying **subordinated stochastic processes** and exploring their applications in **risk and reliability theory**. I am passionate about teaching, fostering development, and promoting mathematical knowledge through collaboration and innovation.

Education

- **Indian Institute of Technology Kanpur** *March 2025 - Present*
  Institute Postdoctoral Fellow
  Supervisor: Prof. Dootika Vats
- **Chennai Mathematical Institute (CMI)** *January 2025 - March 2025*
  Postdoctoral Fellow in Mathematics
- **Central University of Punjab** *March 2021 - August 2024 (awarded)*
  Ph.D. in Mathematics **Coursework CGPA/Percentage**: 75.80%
  Thesis Advisor: Dr. Ashok Kumar Pathak
  Thesis Title: On Some Fractional Stochastic Processes
- **Indian Institute of Technology Delhi** *July 2017 - May 2019*
  Master of Science (Mathematics) **CGPA/Percentage**: 66.93%
  Project: On Singular Value Decomposition and Medical Image Processing.
- **Delhi University** *July 2014 - May 2017*
  Bachelor of Science (Hons) (Mathematics) **CGPA/Percentage**: 81.04%

Research Area

Applied Probability, Stochastic Processes, Markov chain Monte Carlo, Stochastic Differential Equations

Published Papers

1. Shilpa, **Soni, R.**, Pathak, A. K. (2026). Bivariate mixture tempered space fractional Poisson process and shock models. To appear in *Fractional Calculus Applied Analysis*.
2. **Soni, R.**, Pathak, A. K. (2026). Tempered space fractional Poisson process with Poisson time. To appear in *SIAM journal of Theory of Probability and its Applications*.
3. **Soni, R.**, Gajda J., Pathak, A. K. (2025). Iterated tempered stable process. *Statistics & Probability Letters*, 226, 110499
4. **Soni, R.**, Pathak, A. K., Di Crescenzo, A., Meoli, A. (2024). Bivariate tempered space-fractional Poisson process and shock models. *Journal of Applied Probability*, 61, 1485-1501.
5. **Soni, R.**, Pathak, A. K., (2024). Generalized iterated Poisson process and applications. *Journal of Theoretical Probability*, 37, 3216-3245.
6. **Soni, R.**, Pathak, A. K. (2024). Generalized fractional negative binomial process. *Statistics & Probability Letters,* 207, 110021.
7. **Soni, R.**, Pathak, A. K. (2024). Generalized fractional risk process. *Methodology and Computing in Applied Probability*, 26, 42.

8. **Soni, R.**, Pathak, A. K., Vellaisamy, P. (2024). A probabilistic extension of the Fubini polynomials. *Bulletin of the Malaysian Mathematical Sciences Society,* 47:102.

9. **Soni, R.**, Vellaisamy, P. Pathak, A.K. (2024). A probabilistic generalization of the Bell polynomials. *Journal of Analysis*, 32, 711–732.

Submitted Papers

1. Pathak, A. K., **Soni, R.**, (2024). Multivariate tempered space fractional negative binomial process and its applications. Under revision in *Stochastic Analysis and Applications.*

Work in Progress

1. On diffusion processes governed by fractional differential operators (with Prof. Janusz Gajda).

2. Bivariate shock model governed by generalized fractional counting processes (with Prof. Alessandra Meoli).

3. Robust and efficient unadjusted Langevin Algorithms (with Prof. Dootika Vats).

Teaching Assistance/Tutor

1. Elementary Stochastic Processes (IIT Kanpur)

2. Complex Analysis (IIT Kanpur)

3. Sampling Theory (IIT Kanpur)

4. Probability and statistics (IIT Kanpur)

5. Probability Theory (Central University of Punjab)

6. Basic Stochastic Processes (Central University of Punjab)

Courses I Can Teach

Probability and Statistics, Stochastic Processes, Stochastic Calculus, Linear Algebra, Ordinary Differential Equations, Statistical Inference, Measure Theory

Software Skills

A basic knowledge of MATLAB, Python, LaTex, and R.

Conference/Workshop Participation

1. Machine Learning and Statistics: From Theory to Practice at Chennai Mathematical Institute in 2025.

2. GIAN Course on Risky Asset Models with Dependence at Indian Institute of Technology Ropar in 2023.

3. International Conference on Fractional Calculus: Theory, Applications and Numerics at National Institute of Technology Puducherry in 2023 (paper presented).

4. The 10th International Congress on Industrial and Applied Mathematics (ICIAM 2023) held on August 20th to August 25th, 2023 at Waseda University, Tokyo, Japan. (paper presented).

5. National Workshop on Ancient Indian Mathematics at Central University of Punjab in 2022.

6. International Conference on Evolution in Pure and Applied Mathematics at Akal University, Punjab in 2022 (paper presented).

7. High-End Workshop (Karyashala) on Computational Finance at Indian Institute of Technology Goa in 2022.

Achievements

- Qualified Graduate Aptitude Test in Engineering (GATE) in Mathematics. *2020*
- Qualified CSIR-UGC NET (JRF) in Mathematical Science. *2018*
- Secured All India Rank (AIR) 226 in IIT JAM Mathematics. *2017*

References

1. **Dr. Ashok Kumar Pathak**, Department of Mathematics and Statistics, Central University of Punjab, Bathinda 151401, India.
   Email: ashokiitb09@gmail.com
   Tel.: +91-7977862859

2. **Professor Antonio Di Crescenzo**, Department of Mathematics, Università degli Studi di Salerno, Via Giovanni Paolo II, 132 - 84084 Fisciano (SA), Italy.
   Email: adicrescenzo@unisa.it
   Tel.: +39-089-963349

3. **Dr. Aditya Maheshwari**, Department of Operations Management and Quantitative Techniques, Indian Institute of Management Indore - 453556, Madhya Pradesh, India.
   Email: adityam@iimidr.ac.in
   Tel.: +91-9869342910

4. **Prof. Janusz Gajda**, Faculty of Economic Sciences, University of Warsaw, Długa 44/50, 00-241 Warsaw, Poland.
   Email: jgajda@wne.uw.edu.pl